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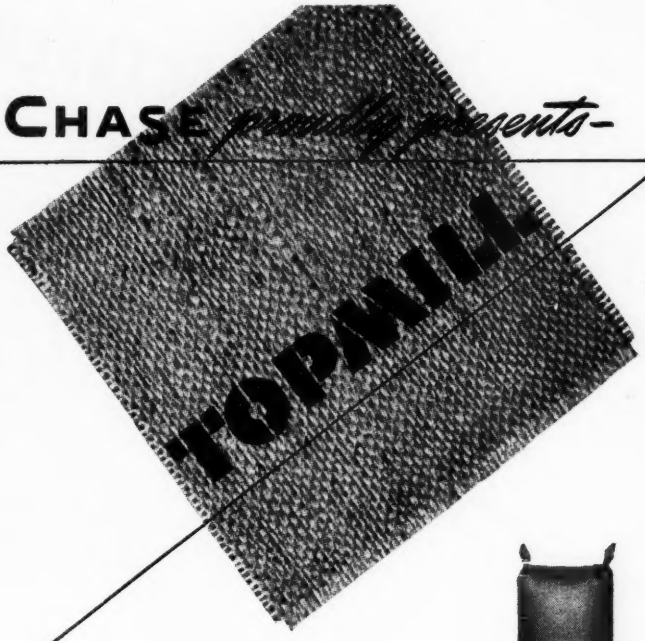

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AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 104 APRIL 6, 1946 No. 7

Soil Fertility and Animal Health

BY J. G. ARCHIBALD

Research Professor of Animal Husbandry, Massachusetts Agricultural Experiment Station.

THE close relationship between soil fertility and animal welfare has been noted by observant husbandmen since earliest times. Probably before the dawn of history, herdsmen observed that their flocks and herds flourished on some pastures and declined on others. The writers of ancient Greece and Rome made mention of the subject as they did of every topic of interest under the sun. Nearly 300 years ago Cammerarius, a German writer, referred to the mineral hunger prevalent among cattle in the Black Forest. Over a hundred years ago, Sprengel, another German writer, observed that "red clover . . . grown upon a marly soil, always contains more calcium, phosphorus, and sulphur than red clover . . . grown upon a loamy soil . . ." He remarked further that since "calcium, phosphorus, and sulphur are . . . essential for the growth of the animal body, it is perfectly evident . . . why clover from a marly soil is more nutritious than clover from a loamy soil."

In American literature the earliest definite reference we find to the subject was made by Owen in 1857 in the second report of the Geological Survey of Kentucky. He called attention to the luxuriant growth of bluegrass on soils derived from the blue limestone and marls of the lower Silurian formation in that state, and to the remarkable development of the livestock pastured on the fields of that region. The reference here is, of course, to the celebrated bluegrass region of Kentucky, and its equally celebrated race horses.

A generation ago Professor J. E. Wing, in an article which he contirbuted to Bailey's Cyclopedia of American Agriculture, wrote the following: "Animals partake remarkably of the nature of the soil on which they grow. The sheep of New Mexico are distinctly different from the sheep of Montana. The horses of the fat limestone soils of England are large, the horses of the peaty, sandy heaths and moors are ponies. Even races of men differ according to the soil on which they live and the water which they drink."

Most of us can recall from our own experience some familiar region in which the livestock in general or some kind or breed of livestock in particular attained to a marked degree of excellence. An illustration which comes immediately to mind is the Grand River region of southern Ontario which has been famous for generations for its alfalfa and its Shorthorn cattle.

General Considerations

Most of the instances cited refer to soils that in their virgin state were naturally very rich. But even the merest tyro knows, or should realize, that soils no matter how rich originally in this respect are a good deal like a bank account. If we keep drawing on them year after year and make no return, or what is perhaps more insidious because less spectacular, if we make only a partial return of fertility removed, eventually nature notifies us in no uncertain manner that our account is overdrawn.

The consequences of such prodigality have been evident for years insofar as plant nutrition and the major elements (nitrogen, phosphorus, and potash) are concerned. Now they are beginning to be manifest from the standpoint of the minor elements in both plant and animal nutrition. Quantity and quality of the crops produced, and hence of

the animal industry based on these crops, are both involved. Since quality, especially from the standpoint of the minor elements, is perhaps the more important consideration of the two, let us briefly postpone discussion of it while we think for a few moments about quantity.

Roughage Quantity

We had in southern New England during the growing season of 1944, an excellent illustration of the part that soil fertility plays in helping to mitigate the ravages of drouth. The extreme lack of moisture experienced in some sections of New England that year, resulted in a hay crop as low as 40 per cent of normal in several of our counties. As a result many dairymen frantically scoured the country for hay and paid as high as $50.00 to a ton for hay, some of it of such low grade that it was fit only for bedding. But our extension specialists repeatedly observed in all this, that the man who had a sound pasture and roughage program based on liberal use of manure and fertilizer, suffered relatively little from the drouth, and in some cases had hay to sell to his neighbors.

Roughage Quality

Quality in roughage is dependent on several factors, principal of which are the amounts of protein, readily available carbohydrates, vitamins and minerals present. We shall see as we proceed that the amounts of these in the roughage are closely correlated with the level of fertility in the soil, some of them more so than others.

Protein, of course, is familiar to all; shortage of it to the point where it becomes a limiting factor in animal health is fortunately rare in this country, but during the past two or three years acute local shortages, in the northeast and the far west, of those protein concentrates normally depended on for maximum production of such important human foods as meat, milk, and eggs, have been and continue to be altogether too frequent to be viewed with equanimity.

The effect of fertilizers in increasing the protein content of roughages, although rather well-known, is worthy of mention in this connection. Evidence on this point has been secured by many investigators but it is sufficient to cite our own work at the Massachusetts Agricultural Experiment Station in which we have been able to increase by about 40 per cent the protein content of grasses, and to nearly double the yield of protein per acre, by the application of 400 to 500 pounds of complete fertilizer per acre.

Of the several vitamins the one which we know most about in this connection is vitamin A, or more correctly its percursors, the carotenoid pigments, which are the forms in which the vitamin exists in plants. A sufficiency of this vitamin is vital to normal reproduction in cattle; its economic significance lies in the fact that much of our roughage is likely to be very deficient in it because of over-ripeness when cut, or faulty methods of curing, or both. The fact of greatest interest for us at the moment is that increased fertility of a soil results in increased carotene content of the roughage grown on it. In some work which we did at the Massachusetts Experiment Station in the late thirties, we were able to increase the carotene content of grass 73 per cent on the fresh grass basis, 86 per cent on a dry matter basis, by application of an 8–6–6 fertilizer at the rate of 400 pounds per acre. These increases were the average results from over fifty samples of seven different species of grass grown on fourteen different plots.

Major Mineral Elements

The mineral elements most likely to be limiting factors in animal health, named in the order of their importance are: chlorine, sodium, phosphorus, and calcium. The first two mentioned are the elements of common salt; they are included here only for the sake of completeness. Because of their relatively high concentration in the blood and other body fluids, sodium and chlorine are of utmost importance to the health of human beings and animals alike, but unfortunately all of our common agricultural plants are poor sources of them. Because this is so, farmers have long since become accustomed to furnishing salt as such to their animals in one form or another. These two elements, therefore, do not concern us directly in our attempt to correct mineral deficiencies through the roughage.

Phosphorus and Calcium

Like sodium and chlorine these two elements are also usually considered together in animal nutrition, since in combination as tricalcium phosphate they constitute over 90 per cent of the ash of bones. Under conditions prevalent in most grazing areas, phosphorus is much more likely to be deficient in the roughage than is calcium, for the very

simple reason that it is concentrated largely in seeds and their by-products, whereas calcium is very largely localized in the cell walls of the fibrous portions of plants.

Phosphorus deficiency in grazing animals is rather generally distributed all over the world. To anyone who has ever seen an emaciated cow chewing for hours on a bone, or an old shoe, or even on a piece of an automobile tire, its symptoms are unmistakable. It has taken its greatest toll in Europe and in South Africa but this country is by no means free from it. The areas where it has given serious trouble are: the costal plain region of the gulf states from Florida to Texas, the Red River valley in Minnesota, and certain other scattered areas in the North Central and Northwestern states. Very occasionally we see it in New England in young cattle and dry cows on poor pasture, especially if there has been a prolonged dry spell. It has been shown by several investigators that the phosphorus content of natural herbage declines rapidly in times of drought. Some of our soils in New England are very low in phosphorus and as a consequence in dry seasons the stage would be set for phosphorus deficiency aplenty were it not for one simple fact, viz.: that unlike some of these other areas, this is not primarily a grazing region. Our cattle are stabled for about six months of the year, during which time they receive at least a small allowance of grain, some of them a liberal allowance. Even when on pasture all cows in milk receive some grain when the pastures are poor. So that, by and large, in New England and the Northeast generally, phosphorus requirements of most of our livestock are met through the phosphorus supplied by our grain-feeding practices.

Phosphorus in Feeds

As for those regions where the trouble is, or formerly was, endemic, it has been found more practicable to supply phosphorus to the animals by feeding bone meal regularly on the range, than to attempt to increase the phosphorus content of the herbage through fertilizer application to the land. The fact should not be lost sight of, however, that this is one means of helping to insure an adequate phosphorus supply and where it will fit into local husbandry practice, farmers should be encouraged to use phosphatic fertilizers for the purpose. This is particularly applicable where large amounts of stable manure are applied to the land; cow manure is relatively low in phosphorus as compared with nitrogen and potash.

Our experience in increasing phosphorus content in grasses by fertilizer application has not, however, been phenomenal. The average increase in our grass plot and pasture studies over a period of about ten years has been approximately 18 per cent, or from an average of about 0.33 per cent in the grass from unfertilized areas to about 0.39 per cent when the same areas were fertilized. This is in contrast to an average phosphorus content of 0.19 per cent for our Massachusetts pastures generally with some values as low as 0.14 per cent.

Calcium deficiency is less common than phosphorus deficiency. Obvious cases of it are most likely to be seen in heavily milking cows on non-legume roughage, especially if there has not been an adequate dry period between lactations. Usually several years of feeding calcium-poor rations will elapse before the trouble begins to be manifest. The commonest symptom is brittle bone as seen in cracked ribs, and hip and pin bones with their caps knocked off. The most logical method of correcting calcium deficiency is the growing and feeding of leguminous roughage, but since it sometimes takes several years to introduce worthwhile stands of legumes into our pastures and mowings, the situation where serious can be alleviated for the time being by the addition of 2 per cent of finely ground limestone to the grain mixture; where phosphorus deficiency occurs in combination with calcium deficiency, the feeding of bone meal will take care of both.

The direct effect of fertilizers and soil amendments in raising calcium content of the herbage is much less marked than for phosphorus. Complete or nitrogenous fertilizer oftentimes causes a reduction in calcium; lime itself usually results in some direct increase, but its greatest effect in this respect is indirect, due to encouragement of the growth of legumes which are naturally rich in calcium.

Minor or "Trace" Elements

In our fertilizer and soil practice we have become accustomed to thinking of the role which certain so-called minor elements play in plant growth. Of more recent origin is the concept that some of these elements may at times be limiting factors in animal production. Those now generally conceded to be in this class are: iodine, iron, copper, and cobalt, magensium very rarely, and manganese possibly.

(Continued on page 28)

Fertilizer Comes to Missouri

By WILLIAM R. THURSTON

President, Missouri Chemical Company, Joplin, Mo.

MISSOURI, a great agricultural state, has had tremendous yields from some of its farms. But the yields per acre have now been considerably reduced by the plant food fertilizer depletion of its soil.

The state agricultural college, Missouri University, has long realized this. They have completely sold crop rotation to the farmers and now the farmers themselves are realizing that rotation alone will not do the job—it is going to take lots of fertilizer.

In 1943 I covered nearly every state in the union looking for a strategic location for a new fertilizer plant. The problem was to survey the postwar distribution, demand for the finished product, and the proximity of raw materials. Finally we decided on Joplin, Missouri, and built the state's first fertilizer plant.

We employ approximately 125 people and during the first 10 months of operation produced in excess of 60,000 tons of fertilizer. With restrictions lifted, 1946 will see a considerable increase in our output. Our plant is located on a railroad siding east of Joplin, known as Atlas, Missouri.

The main building, used for the superphosphate manufacturing and curing, is 375 feet long, 80 feet wide and has a height of 40 feet. Storage silos, scrubbing towers and sulphuric acid storage tanks are located at the south end. On the west side is a spur track for incoming phospate rock. On the east side is the loading dock running the full length.

The main building is connected by an overhead conveyor belt to the dry mixing plant, 250 feet long, 100 feet wide and 40 feet high. At the north end of the dry mixing building is located a storage room where bagged fertilizer is kept for delivery to trucks. Adjoining this room is a unit for bag storage.

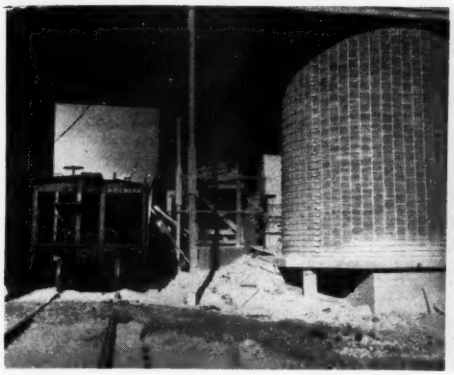
Between the dry mixing building and the larger superphosphate manufacturing and curing shed, is a double spur track for incoming and outgoing loads of fertilizer and other materials. Other buildings at the plant include a modern machine shop and garage, factory office building, and men's locker building.

The incoming phosphate rock reaches the plant in covered hopper bottom railroad cars. From these, the rock runs by gravity into screw conveyors which feed into bucket elevators discharging into brick tile silos.

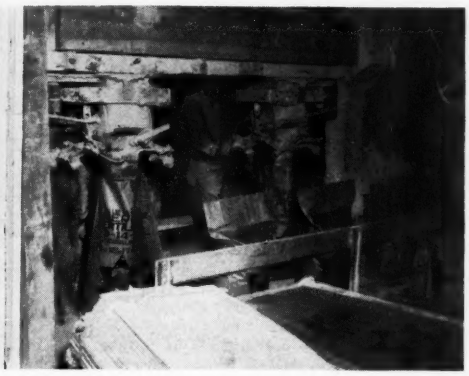
The rock is fed from the silos through gates into a screw conveyor in an underground tunnel, where a second elevator dumps the rock into a hopper over the dust scale. The rock is weighed and discharged into a "mixing pan."

The sulphuric acid is received by pipe line from an adjoining plant and also in tank cars.

View of Missouri Chemical Company plant near Joplin, Missouri



Loading track between main plant and the mix building



Complete fertilizer being bagged for shipment

It is first piped into a steel storage tank and then run by gravity into lead-lined cutting tanks inside the main building, where it is either diluted or strengthened to formula requirements. From the lead-lined cutting tanks, the acid is pumped into smaller tanks over the sulphuric acid scales and run by gravity into the "mixing pan" with the phosphate rock.

While the two ingredients are being mixed, the chemical reaction forms a gas which is sucked off with a large suction fan through specially constructed fume ducts into brick tile scrubbing towers. In these towers are fine mist-like sprays of water through which the gas passes and is purified. The waste water from these scrubbing towers is then filtered through limestone and disposed of.

Where phosphate rock and acid are mixed. Note pipe at right for carrying off gas formed from the chemical reaction

The wet superphosphate is dumped into dens mounted on wheels, where the product forms into a black. The sides are loosened from the den and the block is fed mechanically at a pre-determined speed into revolving cutters. These cutters shave off the superphosphate in small particles, throwing them onto a bucket elevator which carries it to an overhead conveyor belt which runs the length of the main building. From the conveyor belt the superphosphate is dropped into large storage piles where it is allowed to complete the curing process.

After it has been properly cured it is dragged by gear teeth dragline buckets into a bucket elevator. Each dragline has a pull cable of 7/8 inch preformed wire rope, and a tail cable of 5/8 inch rope. Because it is necessary for workmen to handle this cable a great deal, we use only the preformed type which will not barb or flare to cause hand injuries.

The end of the draglines run through sheaves which are fastened to a monorail the length of the building. We use a 25 hp. electric motor. The bucket is equipped with longer than average teeth which enable it to dig and drag at the same time. Delivery from the 3/4-yard buckets is made to a bucket elevator.

When the finished superphosphate is used without the addition of nitrogen or potash, it is screened to the proper size, the larger particles being reground, and is then discharged

(Continued on page 26)

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World Food Outlook

Five hundred million people of the world are confronted with famine due to war and drought.

World wheat production in 1945 was 8 per cent below pre-war, and rice and rye were 5 per cent less than before the war. The total amount of food in the world today is placed at 12 per cent less per person than in pre-war times. But in the United States food production in 1945 was 32 per cent above the pre-war level, and this country is the chief hope of the starving millions.

If starvation is to be thwarted over vast areas of the world for another year, the United States will have to maintain production at high levels. European farmers are straining every effort to grow food, but are faced with serious obstacles of shortage of draft power, equipment, fertilizers, insufficient seed, feed grains for livestock and poultry and lack of transportation facilities.

In India famine is rife because of the drouth and food production awaits the seasonal rains beginning in June. China and other Far Eastern countries are reported cultivating every available patch of land, mainly to produce rice, the chief article of food. Hampered by the war and drouth, the present shortage of rice is acute, and if yields are good this year, production will barely suffice to meet the needs.

To the credit of the Philippine Islands, it can be stated that in spite of the loss of 50 per cent of their water buffaloes—the work stock of the Filipinos—a remarkable showing has been made with 100 per cent increase in sweet potatoes, 30 per cent increase in cassava and 20 per cent increase in other root crops.

Other countries handicapped by the war, are reported making a desperate struggle for food. Self preservation is incentive enough for the struggle, but the handicaps are great.

The world food situation only emphasizes the importance of the United States as the hope of the world for food. To answer this cry of humanity, every effort to grow more food must be made.

This country, too, has its handicaps. Farm labor continues scarce and the production of labor-saving machinery for the farm has been hindered by labor strikes. Fortunately, fertilizers are available in the usual amount, but should the farmer undertake to overcome the shortage of labor and labor saving machinery by fuller employment of fertilizer, there may not be enough fertilizers to adequately overcome production handicaps.

American Potash and Chemical Stock Sold to Investment Syndicate

Alien Property Custodian James E. Markham has announced the sale, on March 27th, of 478,194 shares of Class B stock of American Potash and Chemical Corporation to a group of 108 investment houses headed by Kuhn, Loeb & Co., Glore, Forgan & Co., and Lehman Bros. at a price of $32.29 per share. The above group were the only ones presenting a bid. The stock, which represents 90.79 per cent of the Company's capital stock, was offered to the public on March 28th at $35.00 per share and is reported to have had a good sale, some over-the-counter purchases being made at a premium price.

The stock which was originally held by Consolidated Gold Fields of South Africa, Ltd. and associated companies, was sold in 1929 to two German concerns, Wintershall A. G. and Salzdetfurth A. G., but registration remained in the name of the original owners. In 1942, the Alien Property Custodian, on discovering the actual ownership of the stock, vested the property in himself and throughout the war the company continued to operate under its present officers and executive staff.

Recently the company has entered on an expansion program to cost around $1,000,000 over a period of three years to increase and improve facilities at the plant at Trona, California. Executive offices are located at Los Angeles, with the sales offices continuing at 122 E. 42nd Street, New York.

Combined Food Board Committee on Fertilizers to Continue Work

At a meeting of the Committee on Fertilizers of the Combined Food Board in Washington on March 21st, all members agreed that it is desirable for the Committee to continue its work during the 1946–47 fertilizer year in view of the prospect for continuing shortages of many fertilizer materials. Preliminary estimates indicate deficits of approximately 457,000 short tons of nitrogen and approximately 3,100,000 long tons of phosphate rock. Supplies of potash will be adequate only if the prewar level of production in Germany can be realized and the necessary transport can be mobilized. Prospective production data is being assembled and the Committee proposes to reach agreement regarding preliminary allocation recommendations for the 1946–47 fertilizer year before the end of May.

Reports from North Africa indicate improved production of rock phosphate, due in part to mining supplies shipped from the United States and the United Kingdom. European potash production shows some improvement but is still far from sufficient to meet the urgent requirements of Europe and the United Kingdom.

To meet urgent food requirements in the American and British zones of Germany the Committee agreed to shipment of soluble phosphates from Belgium for use during this crop year. Because of India's urgent food needs, the Committee also agreed to additional shipments of ammonium sulphate to India in April from an extremely short world supply.

The following countries are represented on the Committee: United States, United Kingdom, Canada, France, Norway, Belgium, Netherlands, Denmark, and Chile. UNRRA representatives participate in all Committee discussions.

Victory Garden Goals Increased

The U. S. Department of Agriculture held a National Garden Conference at Washington on March 26–28, attended by Department officials and garden leaders from all parts of the country. The meeting recommended a national goal of 20,000,000 Victory Gardens, which is an increase of 1,600,000 over the estimated number of gardens planted last year. The keynote of the meeting was the importance of the gardening program in world famine relief and famine prevention. By growing and preserving food for his home, the Victory Gardener releases an equivalent amount for famine relief, and at the same time helps prevent inflation of food prices during the period of all-time high demand.

Plant Food Institute Awards Scholarships

Four one-year, $200 scholarships to State College have been awarded by the Plant Food Institute, Inc., to North Carolina's 1945 4-H Club crop growing champions, it is announced by L. R. Harrill, state 4-H leader.

The four winners are Jimmie Herring, 17, of Selma, cotton; Jimmie Wise, 14, Nealsville (McDowell County), corn; Ray Howell, 16, Pikeville, vegetables; and William Shackelford, 17, Eureka, tobacco. Each of the champions averaged more than a dollar an hour for his efforts in winning the state crown and the scholarship.

International Plans Sale of Additional Stock

Following a meeting of the board of directors of International Minerals & Chemical Corporation on March 28th, Louis Ware, president, announced that a special meeting of stockholders has been called for May 20th to approve the sale of 145,834 shares of common stock presently authorized and unissued.

If the shareholders at the special meeting authorize the sale of this stock, rights will be given to present shareholders to purchase additional shares on the basis of one new share for each five common shares owned as of record date Aparil 12, 1946.

Proceeds from the sale of these shares will be used to finance new and expanding projects for the corporation and to replenish working capital that has been expended in the acquisition and development of mines and plants, Mr. Ware said.

New Jersey Fertilizer Sales

According to figures compiled by Firman E. Bear, chairman of the Soils Department, fertilizer sales in New Jersey in 1945 totaled 245,173 tons, in comparison with 234,458 tons reported for 1944. Of this, 212,421 tons were sold during the January–June period and 32,752 tons during the July–December period. Thus the spring sales constituted about 87 per cent and the fall sales 13 per cent. These mixed fertilizers and fertilizer materials supplied approximately 10,000 tons total N, 24,000 tons available P_2O_5, and 18,500 tons available K_2O. The average fertilizer, therefore, approximated a 4–10–8.

Of the total tonnage, mixed fertilizers amounted to 226,213 tons and individual materials to 18,960 tons. The leading grades were: 5–10–10, 93,945 tons; 4–12–8, 54,356 tons; 5–10–5, 29,409 tons; 3–12–6, 20,724 tons; 3–9–12, 10,931 tons. In addition to the above tonnage, 186,122 tons of liming materials were sold, a drop of 17,000 tons from 1944.

Prospective Plantings for 1946

The Crop Reporting Board of the U. S. Department of Agriculture has issued their estimate of the acreages which will probably be planted to the principal crops. The total comes to 357½ million acres, compared with 357 million in 1945, an average of 355 million during the past 10 years, and the peak of 375 million in 1932.

Increases are indicated for sugar beets (20 per cent), tobacco (6 per cent), rice (4 per cent), oats (3 per cenr); also slight increases for corn, spring wheat, and barley. Soybeans and flaxseed show the greatest decrease.

Crop	Planted Acreages Average 1935–44	1945	Indicated 1946
	Thousands		
Corn, all	94,772	92,867	92,993
All spring wheat	19,401	18,658	18,9 1
Durum	2,856	2,010	2,447
Other spring	16,545	16,648	16,514
Oats	41,191	45,234	46,444
Barley	14,918	11,429	11,521
Flaxseed	3,054	4,066	3,497
Rice	1,188	1,517	1,575
Sorghums	16,792	15,837	14,787
Potatoes	3,053	2,896	2,738
Sweet potatoes	781	715	7 !
Tobacco*	1,554	1,846	1,954
Beans, dry edible	2,089	1,760	1,673
Peas, dry field	415	528	462
Soybeans†	9,886	13,412	11,840
Cowpeas†	3,034	1,616	1,468
Peanuts†	2,938	3,958	3 759
Tame hay*	57,879	59,905	59,791
Sugar beets	853	775	933

*Acreage harvested.

†Grown alone for all purposes. Partly duplicated in hay acreage.

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FERTILIZER MATERIALS MARKET

NEW YORK

No Improvement in Fertilizer Material Supply Expected This Season. Machinery Shortage Hampers Producers. Sulphate of Ammonia Situation Improving but Still Below Normal. Feed Market Taking Almost All Organics. Phosphate Rock Reserve Stocks Used Up

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, April 1, 1946.

As a result of the very heavy demand from farmers, the fertilizer manufacturers have continued to press for full contract deliveries on all basic materials. The general supply situation shows no indication of improvement before the end of the current planting season. The hoped for increased production of various raw materials has been delayed by the inability of producers to obtain new machinery and replacement parts.

There have been no imports in this market during the period covered, and exports have been practically non-existent in spite of increasingly active inquiry from foreign buyers.

Sulphate of Ammonia

Production continues to show an increase over recent weeks but supply remains far short of demand. It is reported that UNRRA has recently contracted through the Treasury Department for 5,000 tons, which makes a total of 10,000 tons reserved for this agency. It is anticipated that next month's production of ammonium sulphate will be at about 25 per cent of normal.

Nitrate of Soda

Call for nitrate of soda continues to exceed available supplies of both the domestic and imported material. However, no critical shortages are expected during the balance of the fertilizer year. Because of increased shipping facilities March and April deliveries of Chilean nitrate should be up to schedule.

Organic Materials

Token shipments of tankage have recently arrived from South America, but these small supplies were immediately taken by the feed industry. It is fairly certain that no imports from South America will be available for the fertilizer industry this year.

Superphosphate

Production for January shows an approximately 5 per cent increase over the same period last year. However, subsequent production of this material has been retarded by the continuing tight supply situation in phosphate rock. The supply of sulphuric acid is able to satisfy present demands by acidulators.

Phosphate Rock

Shipments are being made against current production as reserve stocks have been almost completely drained. Shortage of construction materials has made it impossible to increase output, but priority assistance in this respect has been requested through the Civilian Production Administration.

Potash

Existing contracts are being fulfilled, but there are no stocks available to meet the additional demand. Although domestic producers have recommended that potash salts be placed under allocation again, there has been no official announcement made yet in this respect.

PHILADELPHIA

Labor Troubles and Machinery Replacement Difficulties Cut Down Production. Demand at Greatest Peak. Materials Still Short

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, April 1, 1946.

As a whole, the unsatisfactory condition of the fertilizer market continues, and if anything is worse. Labor difficulties are still being encountered and mechanical troubles are legion. In many instances one machine is being dismantled piece by piece to provide needed replacements for companion machines, thus cutting down the manufacturing capacity. The trade is faced with the greatest mixed-goods demand it has ever had, including increased export demand. The actual volume of business, however, is reduced due to lack of materials and physical inability to keep up with orders. This means that there are practically no inventories.

Portion of one of the large engineering department rooms of Chemical Construction Corporation.

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It's the CHEMICO Engineering Department . . . specialists who are experienced in design of processes, equipment and structures for the manufacture of acids and heavy chemicals for the fertilizer industry. The work of this corps of specialists is guided by world renowned technologists who, for 30 years, have made CHEMICO the acknowledged leader in this field.

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Complete Fertilizer Plants

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Sulphate of Ammonia.—Demand is in excess of supply, and while there was a reported loss of over 120,000 tons caused by the steel strike, it is expected there will be another 15,000 tons lost in March and early April by reduced operations at the coke ovens because of the threatened coal strike.

Nitrate of Soda.—Supply continues short of the demand and there are practically no inventories; but there have been some recent arrivals to somewhat relieve the situation.

Castor Pomace.—While a few shipments have moved on contract, there has been no new business offered for nearby shipment.

Blood, Bone Meal, Tankage.—Not only is the supply of these organics below normal, but practically the entire supply goes to the feeding trade.

Phosphate Rock.—This is being shipped as mined, with no inventories possible and the supply wholly inadequate.

Superphosphate.—Production has been above normal, but still much behind the demand.

Potash.—Production is far behind the demand, and matters are made worse by the extreme shortage of empty cars. It is reported that the Government has sold to a group of New York financiers its interest in one of the potash companies for well over fifteen million dollars.

CHARLESTON

Tight Situation Continues on All Materials. Government Exports of Nitrogen and Phosphates Increases Shortage.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, April 1, 1946.

Organics.—Organics of all kinds remain extremely tight. The increase in OPA ceiling on castor pomace caused no improvement in available supplies, as standing contracts are keeping market cleaned of supplies. Imported bone meals, blood, tankages, etc., from South America remain unobtainable because of ceilings.

Sulphate of Ammonia.—This material is still very tight even though production is increasing. Loss of approximately 125,000 tons during steel strikes is still being felt. The Government has allocated an additional 5,000 tons to UNRRA which will affect the domestic situation accordingly.

Nitrate of Soda.—Supplies of this material are still below demand but the importation schedules for Chilean nitrate are expected to be met during March and April.

Phosphate Rock.—Current production of phosphate rock is trying to meet the demand resulting in cleaned stock piles of the producers. The Government is contemplating allocating additional for Australia which makes the situation more acute.

Ammonium Nitrate.—Producers of this material for domestic consumption are hampered by demand of a great part of their production for shipment to Europe by the Government. Supplies are tight.

Fish Scrap.—Exceedingly scarce with producers tending to prepare their production of fish materials for the feed market rather than for the fertilizer industry.

CHICAGO

Practically No Offerings of Fertilizer Organics for This Season. Ceiling Prices Still Prevail in Feed Market

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, April 1, 1946.

Prospects of offerings of organics for this season are nil as far as the trade can learn. Demand keeps active without any sales being reported. Up to now no new developments have occurred with respect to Order M-390, though it may be that a final decision is in the offing.

Ceiling prices are well maintained in the feed market. Limited offerings, with firm

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and urgent demand, continue, though this situation should ease now that pastures are rapidly developing.

Ceiling prices are:

High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, $5.53 per unit ammonia ($6.72 per unit N); blood, $5.53 ($6.72 per unit N); dry rendered tankage, $1.25 per unit of protein, f. o. b. producing points.

January Superphosphate Production Increases

After showing a decline from the November figures, the production of superphosphate in January increased to 717,674 tons (basis 18 per cent APA), a rise of 9.3 per cent, according to the figures of the U. S. Bureau of the Census. Shipments were again about equal to production and stocks on hand showed a slight increase at the end of the month, amounting to 919,618 tons (basis 18 per cent APA).

	Normal 18% APA	Concentrated 45% APA	Base Goods 18% APA
Production			
January, 1946	650,040	25,419	4,086
December, 1945	593,594	23,484	4,121
January, 1945	626,947	18,103	4,302
Shipments and Used in Reporting Plants			
January, 1946	652,802	22,374	3,040
December, 1945	594,566	24,530	318
January, 1945	575,097	25,771	4,114
Stocks on Hand			
January 31, 1946	813,837	35,663	16,623
December 31, 1945	808,027	32,556	15,577
January 31, 1945	861,087	24,820	13,294

International Announces New Phosphate Project

Plans for immediate construction of a new phosphate mine and plant near Bartow, Florida, have been announced by Louis Ware, president of International Minerals & Chemical Corporation. The plant is expected to have an annual capacity of one million tons and is scheduled to begin operation July 1, 1947.

The plant will be built on the 2,000-acre phosphate property recently purchased by the company and will be the largest and most modern phosphate mining operation in the United States. The mine is considered by metallurgists to be one of the richest phosphate deposits in the country and its production will double International's phosphate output, already the world's largest. The de-

CASE HISTORY No. 4

in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

COST COMPARISON

	100 lb. Open-Mouth Fabric Bags	Multiwall Paper Valve Bag
Bag cost per M	170.00	92.66
Bag cost per 100 lbs.	.1700	.0927
Labor cost per 100 lbs.	.0029	.0024
Total bag and labor cost per 100 lbs.	.1729	.0951
Saving per bag, paper over cotton		.077¢
Saving per ton, paper over cotton		1.56

DETAILS OF LABOR COSTS

Fabric Bags	Production per hour	Cost per 100 lbs.
4 men packing and closing at 95¢ per hour	132,000 lbs.	.0029
Multiwall Paper Valve Bags		
4 men operating packers at 95¢ per hour	156,000 lbs.	.0024

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prove their worth . . . in SALT

This fourth case history, in a series of MULTIWALL success stories, relates the experiences of one of the leading American salt refining companies. The multiple problems of caking, contamination, and absorption of odor were solved and economy in packaging was effected after consultation with St. Regis field engineers. As a result, this large salt refinery has been a satisfied user of Multiwall Paper Bags and St. Regis Valve Bag Packers for over ten years.

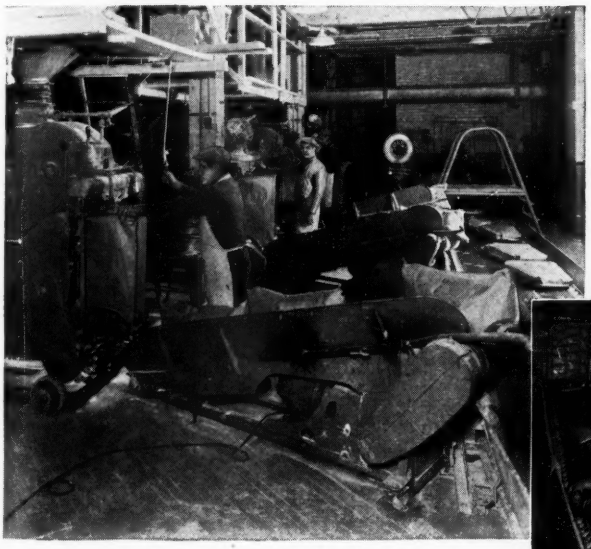
PROTECTION: The multiple layers of kraft paper combined with a moisture proof sheet prevent penetration of water and atmospheric moisture and keep the salt clean and free from caking. No longer is there any problem of lint and dirt in the salt.

REDUCED CONTAINER COSTS: A 46 per cent saving in bag cost has been made by using Multiwall Paper Bags instead of fabric bags.

INCREASED PRODUCTION: An increase of 18 per cent per hour in packaging output, with the same crew, was made possible through use of Multiwall Paper Bags and St. Regis Valve Bag Packers.

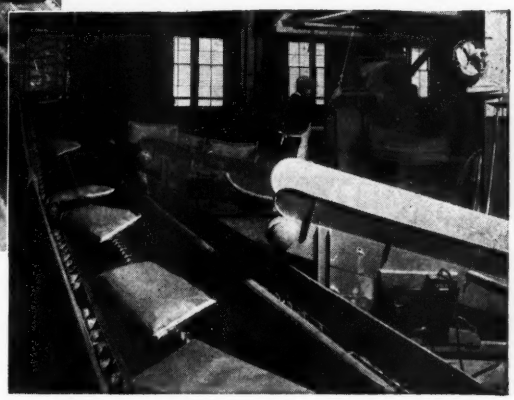
EASIER HANDLING: Small portable conveyors running from each of the valve bag filling machines deliver the 100-lb. bags to a large master conveyor on which they ride to the shipping room.

CONSUMER PREFERENCE: Customers express satisfaction with the Multiwall Bag because it protects the product in transit and while stored and eliminates the danger of the salt absorbing odors from other commodities.



Left: *Operators filling 100-lb. Multiwall paper bags using St. Regis Valve Bag Packers. Machine deposits filled bags on small portable conveyors.*

Below: *From small conveyors illustrated on left filled bags are delivered to this master conveyor which delivers the 100-lb. bags to the shipping room.*



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velopment will be called the Noralyn mine.

The project will contain a number of metallurgical innovations developed by International's research division, providing a higher recovery rate with a higher grade product than has every been experienced in the industry. The entire development is in line with International's policy of modernization and improvement of its position in phosphates.

In announcing the corporation's decision to begin construction now, Mr. Ware emphasized the world's critical need for food and the shortage of minerals in our diet.

"It has never been a secret that the only way to feed a hungry world is to grow sufficient food, and International, through its research and its development of mineral and plant foods, is prepared to make a valuable contribution in meeting this crisis," he said.

Fertilizer Boosts Massachusetts Corn Yields to Over 100 Bushels

Answering their own question of "Where is the corn?" Massachusetts 4-H youths are raising considerable amounts of the important animal and poultry feed as protection against shortages. Yields of 100 bushels to the acres are not uncommon, according to H. A. Leland, assistant state club leader, who handles the 4-H livestock and corn projects in the state.

Demonstrations carried on under the direction of W. G. Colby, research professor of agronomy at Massachusetts State College, Amherst, in 1945 to determine what effect a little extra fertilizer would have on yield brought results on 17 plots ranging from 44 to 118 bushels per acre. There was an average increase of 23 bushels per acre and in some instances yields were more than doubled through use of fertilizer.

Topping the list of four project members who boasted yields of 100 bushels or more per acre were Gordon Osborne and Clifton Mudge, Rockland, R.F.D., who got 118 bushels per acre from their joint plot. Other boys getting outstanding yields were Mike Lago, Essex, 102 bushels per acre; Robert Pender, Essex, 116; and Warrne McKinstry, Hampden, 100 bushels per acre.

Fertilizer for the project was applied in July, 1945, at the rate of 600 pounds of 10–10–10 per acre side-dressed. Despite the fact that 1945 was too wet for best results, club members are enthusiastic about the project and will raise more corn this year, Leland said.

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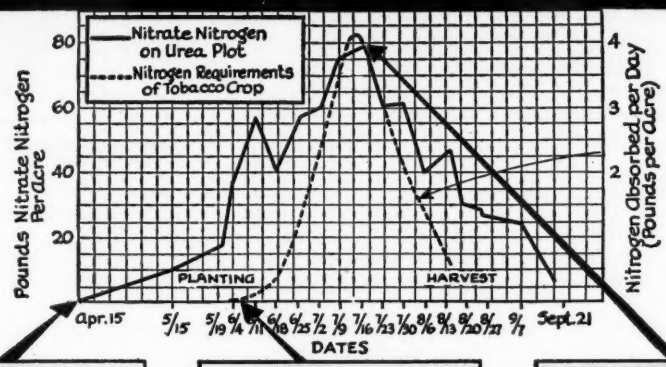
See page 29

Here's a new curve in tobacco growing!



UREA NITROGEN on the tobacco plot turned into nitrate nitrogen like this.

TOBACCO PLANTS began absorbing nitrogen like this—took up ⅓ of the total in 10-day peak.

"UREA PRODUCED nitrates more in accord with the plant's requirements than did any of the other sources."**

** Connecticut Experiment Station

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Urea Nitrogen in your fertilizer is converted to nitrate nitrogen according to the needs of tobacco plants. Because of the chemical changes it undergoes in the soil, it resists leaching until it is nitrified by soil micro-organisms and made available to the growing plants.

Du Pont UREA-AMMONIA LIQUORS are an excellent source of urea nitrogen. They're low in cost, easy to handle and produce quick-curing mixtures that store well and drill well.

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Maple Fertilizer Experiment Started in Maine

In an attempt to discover whether it would pay maple syrup producers in Maine to fertilize their trees, Extension Forester Albert D. Nutting and Oxford County Agent H. A. Leonard of the Maine Agricultural Extension Service, with the cooperation of Charles and Kenneth Cooper, have started an experiment on the Charles Cooper and Son Farm in Buckfield, Me.

Three groups of 14 trees each have been marked and numbered. One group of maples will be treated by broadcasting a complete fertilizer (7–7–7) around the base of the trees, while another group of 14 will be fertilized by filling with fertilizer holes made with crowbars. Approximately one pound of fertilizer for each inch of diameter of the tree will be used. The third group of trees will be left untreated as a means of checking the effects of fertilization.

Each time the sap is collected from the numbered trees, a record will be kept of the number of pounds of sap produced and its sweetness as measured on the hydrometer. The trees will also be measured at the end of the season to check their growth. When the season is over a complete record of the production of each tree will be available and some valuable conclusions may be reached regarding the value of fertilization of maples.

Howard Succeeds May as Agricultural Chemistry Head

Dr. O. E. May, chief of the Bureau of Agricultural and Industrial Chemistry, U. S. D. A. resigned effective March 31 and was succeeded by Dr. L. B. Howard, assistant chief of that Bureau. Dr. May, who is leaving the U. S. D. A. to become associated with a large corporation in an executive capacity, rose from the ranks in the Department where he has served for the last 23 years. He began as an assistant in a laboratory and was promoted successively until he became Chief of that Bureau.

Dr. Howard has been associated with the Bureau of Agricultural and Industrial Chemistry for 14 years. He became assistant chief of the Bureau last November. He has had wide experience in searching, through chemistry, for outlets for the products and by-products of the farm and is thoroughly familiar with that phase of the national farm program. Dr. Howard was born at Bloomington, Ill., in 1905 and received his Bachelor's degree from Purdue University in 1927, his Master's degree from the University of Chicago the same year, and the Ph.D. degree from the University of Chicago in 1930. He is a member of the American Chemical Society and the Institute of Food Technologists.

Nitrogen Needed by Oats in Iowa

Each bushel of oats harvested takes a pound of nitrogen from the soil. So Iowa farmers can profitably use a nitrogen fertilizer on their oat crops, say Iowa State College agronomists.

For the benefit of the legume seeding an application of phosphate fertilizer is advisable, too. And using potash will pay on some soils.

On most farms there is little available nitrogen left in the soil by oats seeding time, the agronomists say. Two or more corn crops following a legume seeding use up most of the available nitrogen supply. When manure is spread it usually goes on ahead of the corn, so little benefit is obtained by the oats from this fertilizer, either.

In 1945 an average increase of 20.0 bushels

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SOUTH AMERICAN DRY RENDERED TANKAGE

PEOPLES OFFICE BUILDING
Charleston, S. C.

was obtained on 22 experimental plots from the application of 200 pounds of ammonium sulphate per acre ahead of oat seeding. These plots represented all Iowa areas.

The early part of the growing season last year was cool and moist, a condition that gives nitrogen fertilizer a chance to show the best results. In a dry, warm spring the results might not be as satisfactory.

Even though the yield response might not be as great in a favorable year, the agronomists believe it will pay to use nitrogen fertilizer when oats follow two or more years of a crop that is not a legume.

A suggested fertilizer program is to apply 100 to 150 pounds of ammonium sulphate or its equivalent in some other nitrogen fertilizer; 200 pounds of 0–20–0, 0–20–10 or 0–20–20 for red clover seedings or 300 pounds for alfalfa.

On fields where better management has been practiced, application of the nitrogen fertilizer may be delayed until two or three weeks after the oats are up. If the crop shows signs of nitrogen deficiency the fertilizer may be applied as a top-dressing.

Animals Are Not So Dumb

Pass the lime and phosphate, Mama, this grass tastes dead to me.

Farmers and agricultural workers throughout North Carolina are reporting new stories every day about the discriminating tastes of animals.

And even "the blind shall lead them . . ."

On one farm a blind horse was put on pasture. In the pasture was a plot which had been treated with a complete mixed fertilizer, and the blind animal ate continually from the treated pasture. The horse was observed eating near the edge of the fertilized plot one day and when he finally nosed into the unfertilized area, he immediately drew his head back and continued his meal in the fertilized pasture.

From Hyde County in the east and Haywood, Buncombe and other counties in the west come repeated reports that winter grazing deer regularly chose to browse in woodland areas which had been fertilized.

Two Wake County dairymen, R. Wilbur Yates and W. B. Franks, experimented with their cattle by placing a good tonnage of lime and phosphate on certain sections of permanent pastures. Immediately upon entering the pastures, cattle found the treated areas and refused to graze the unfertilized parts. "All of this proves that animal have a very fine taste discrimination and will always select forage which is high in mineral content because nature has taught them to eat foods which are best for them."

One farmer was startled when for three weeks he observed 20 head of cattle remain on 20 acres of corn stalks in a 300-acre corn field which had no fences. Then he remembered having plowed under 70 pounds of nitrogen per acre on the 20-acre strip in addition to regular fertilizer.

Potash Helps Reduce Lodging in Hybrid Corn

One of the chief advantages of hybrid corns over the old open-pollinated varieties is their resistance to lodging. But Edward H. Tyner of the agronomy department of the Agricultural Experiment Station, West Virginia University, points out that other defects may be responsible for lodging.

During the past four years, experiments have been conducted in Preston and Monongalia counties on the fertilization of corn. Lodge-resisting hybrid-corn varieties were planted in all the fertilizer trials. But where heavy applications of nitrogen were made, the nitrogen had to be balanced with equal amounts of potash. Otherwise, severe lodging resulted. The same thing has been observed in other states, he reports.

Root diseases, root insects, and worms may be the cause of lodging in hybrid corn, Tyner

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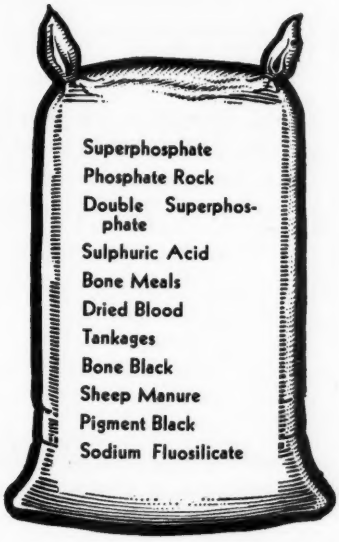

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says. If none of these is present, the lodging may result from heavy nitrogen applications without enough potash.

While West Virginia soils for the most part are not strikingly deficient in potash, some areas will require more potash if heavier nitrogen applications become common, according to Tyner. The agronomist recommends 100 pounds muriate of potash applied and worked into the soil before corn-planting time.

Corn Yield Doubled in Fertilizer and Seed Demonstration

Two to two-and-a-half times more corn per acre were the results of fertilizer and good seed demonstrations conducted in 14 counties last year by the Tennessee Agricultural Extension Service in cooperation with the State Fertilizer Council and the Tennessee Crop Improvement Association, according to records of U-T Extension agronomists. The results were so gratifying that some 300 farmers throughout Tennessee will conduct similar demonstrations this year.

An average yield of 58 bushels per acre was obtained from heavy row fertilization, and 76 bushels from heavy plow down applications, the records showed in instances where accurate results could be obtained. The unfertilized check plots yielded only 30 bushels per acre.

Row applications consisted of 350 to 400 pounds per acre of mixed goods (4–8–8, 5–5–10, or 4–12–4) depending on indicated need from soil tests, applied in row at or before planting, plus top-dressing of 150 pounds nitrate of soda when corn was knee high. Plow down applications consisted of 1,000 pounds of 10–6–4 or 1,200 pounds of 7–7–7, depending upon soil test results. This was broadcast before planting, or placed in furrow during plowing, plus about 150 pounds of 4–8–8 (or other grade as test showed need) in row at planting to start crop. In each case, rate and grade of fertilizer application was determined by the need as shown in soil tests.

Factors important to efficient, high corn yields are summarized by Extension agronomists as including: well adapted soil; adapted seed, preferably an adapted Tennessee hybrid; planting adjusted to fertility and expected yields; best culture, including good seed bed, shallow cultivation, and early lay-by; balanced fertilization; and crop rotation and erosion control.

FERTILIZER COMES TO MISSOURI

(Continued from page 11)

into a hopper. From the hopper it is picked up, packaged and wighed in 100-pound paper bags on scales which are particularly adapted to the fertilizer industry.

The weighed bags are dropped from the scales onto a slat converyor which runs them through a sewing machine to seal the open ends. After being sealed, the bags of fertilizer are loaded by conveyer into railroad freight cars, or by hand into trucks for shipment to fertilizer dealers.

When superphosphate is used to make complete fertilizer, another dragline conveys it from the stock piles to an elevator, from which it is discharged to a 16-inch overhead conveyor belt running from the superphosphate and curing building to the mix building. Here it is temporarily stored in a large overhead hopper.

From the hopper, the superphosphate is weighed and discharged by gravity into another elevator, and is then screened and dropped into a dry mixing unit, with the proper amount of nitrogen and/or potash, limestone, and other ingredients to give us the required formula.

From the dry mixing unit the material is discharged by a second elevator onto a second 16-inch belt conveyor which dumps it in storage bins in the dry mix building for further curing.

After curing, this complete mixed fertilizer is dumped into a shipping machine, where it is again reground, screened, and packaged in 100-pound bags, as described above.

We feel that the fertilizer manufacturing business is in its infancy. If nothing else, our short experience right here in Missouri has proved this to us. Agriculture has been said to be the backbone of America. As a fertilizer manufacturer, I am convinced that fertilizer is the backbone of agriculture.

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See Page 20

SOIL FERTILIZATION AND ANIMAL HEALTH

(Continued from page 9)

Iodine

Iodine is the only one of these elements to which the above statement is not strictly applicable. Iodine deficiency in animals as manifested by the occurrence of simple goiter has been recognized for at least a generation. There are several regions in this country where simple goiter in humans and animals is endemic. These are located chiefly around the Great Lakes and in the Northwest. Since most of the iodine in the world is found in sea water, the problem does not present itself in costal regions. In New England for the most part we are near enough to the coast so that the trace of iodine needed for normal functioning of the thyroid gland is present in the drinking water. Occasionally we see a case of human goiter here but in a quarter century of experience in animal husbandry I have never seen in this region a hairless pig, or a big-necked calf, foal, lamb, or kid; these are the tell-tale signs of iodine deficiency in animals.

Since iodine compounds are relatively expensive and are readily leached from the soil, it is not practicable to apply them as such. Certain naturally occurring inorganic salts used as fertilizers contain traces of iodine; if not too highly refined they supply the necessary amounts of the element. In general, however, human and animal requirements nowadays are taken care of by the rather universal use of iodized salt.

Iron, Copper, and Cobalt

Iron, copper, and cobalt, for convenience we group together since they are all associated with the function of blood formation. Also it is claimed that sometimes deficiency of two of the three or of all three may occur on the same soil type. The outward manifestation of these deficiencies is nutritional anemia, a disease of cattle and sheep which occurs widely scattered over the world and is known by various names. The regions in this country where it has been definitely recognized are in Florida, northern Michigan, Massachusetts, and New Hampshire. In Florida is is known as "salt sick" and seems to be due to iron or iron and copper deficiency in some cases, to cobalt deficiency in others. In Michigan is is known as "Grand Traverse disease" from the region where most prevalent, and is attributed to cobalt shortage. In this state it is known as "neck ail," not because it gives the cattle a pain in the neck, but because it attacks the cattle when they graze on the sandy necks of land in and around Buzzard's Bay, Cape Cod Bay, and Vineyard Sound. In New Hampshire it is known as "Burton ail" from the township where first noticed, and is rather widely distributed on certain soil types of granitic origin. Formerly we thought it due to iron deficiency alone, but more recent developments, particularly the work done in the University of New Hampshire, lead us to believe that cobalt is at least as important as iron. Cattle recover rapidly when they are fed compounds of these elements, when removed to so-called "healthy" farms, or when fed roughage grown on other soils.

The indirect mode of action of cobalt is extremely interesting. Although extremely small quantities of the element effect a phenomenal recovery in cattle when administered orally, it has been discovered that cobalt compounds injected into the blood stream are without effect. At first this apparent paradox was very puzzling, but now it is rather generally acknowledged that cobalt is essential to the proper functioning of the microflora of the paunch or first stomach of ruminants. It has been known for a long time that these organisms synthesize the vitamin B complex for use by their hosts; only recently has it been suggested that they need a trace of cobalt in order to adequately perform this task. So that what has commonly been referred to as a cobalt deficiency disease in cattle and sheep is primarily a vitamin deficiency, the cobalt acting by remote control, to use an overworked modern phrase.

Soil amendments will no doubt correct the trouble in time but, for the present, administration of cobalt compounds furnishes quick and phenomenal relief. Where iron deficiency

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enters in, correction through the soil seems practicable; in some work done on the problem about ten years ago we were able to increase the iron content of grasses grown on some of the "neck ail" soils nearly 58 per cent by application of iron ammonium citrate at the rate of 600 pounds per acre. Available iron residual in the soil after the grass crop had been removed, was increased nearly fourfold.

Magnesium

Very infrequently we find in the literature reference to magnesium deficiency in cattle; sometimes it is referred to as "grass staggers" or "grass tetany," because it sometimes occurs when cattle are turned onto lush pastures in the spring. It is characterized by sudden onset in animals previously in apparent good health. The animals stagger, walk in circles, fall and usually die in a few minutes in convulsions. In view of the fact that within the past decade or so magnesium in numerous plant species has been rather clearly demonstrated in this region, magnesium tetany is a possibility, although the only cases we know of that could be definitely labelled have been produced experimentally. Since magnesium deficiency in plants can be corrected by the use of dolomitic limestone or Epsom salts it would seem that the extremely rare cases of the deficiency in animals could be handled through the soil and the roughage rather than through resort to magnesium supplements in the feed, although the latter method may be indicated in emergencies.

Manganese

Last and perhaps least, we come to manganese. Manganese deficiency in four-footed animals has rarely, if ever, been encountered in practice. The element is of considerable significance in the rearing of chickens. A deficiency of it is a contributing factor in the so-called slipped tendon disease (perosis) and there is evidence that a certain minimum amount is essential to the proper formation of egg shells. One investigator reports that administration of manganese is effective in certain types of sterility in bulls but his work has not been confirmed by others.

Conclusion

Now what does all this add up to? In several places the statement has been made that, especially for immediate results, mineral deficiencies can be corrected more efficiently by direct feeding of supplements to the affected animals than by application of soil amendments. Such a situation would seem to indicate not too close a relationship between maintenance of soil fertility and preservation of animal health. This, however, is not our attitude in the matter. On the contrary it is our belief that, except for salt and iodine, prevention of such deficiencies through a well planned soil fertility program is a much wiser procedure than emergency correction of troubles after they have manifested themselves in the form of decreased production or death losses.

Except for extensive grazing areas where the application of soil amendments is obviously impracticable, our motto should be, "Put the minerals on the land—not in the manger."

Fertilizer Increases Texas Cotton Yield

Use of fertilizer where it is adapted is a primary factor in profitable cotton growing, says E. A. Miller, agronomist for the Texas A. and M. College Extension Service. A seven-step program sponsored by the Texas Extension Service and designed as a permanent basis for increased acreage production of cotton, emphasizes fertilizer as among the foremost practices in obtaining the highest yields from the soil.

Proper use of commercial fertilizers on the sandy loam of the eastern half of Texas, on the Wilson and Crockett soils of central and south Texas, and on the heavy soils of the Gulf Coast pays dividends. At present prices for farm crops, including cotton, yields can be increased profitably through the use of fertilizers. Miller says this has been verified by Experiment Station tests and many demonstrations conducted by county agricultural agents.

Increased yields of cotton ranging from 60 to 100 pounds of lint an acre were obtained by the use of 400 pounds of fertilizer an acre on the Experiment sub-stations at Tyler, Nacogdoches, Angleton and College Station. The recommendation for cotton is 300 to 400 pounds of 5–10–5 or 6–8–4 an acre in east Texas, except on soils where cotton rust and wilt are common. On such soils fertilizers which are high in potash, such as 4–8–8 and 8–8–8, should be used. In the Gulf Coast prairie 300 to 400 pounds of 6–12–0 on the heavy black soils, and 6–8–4 on the sandy soils are recommended.

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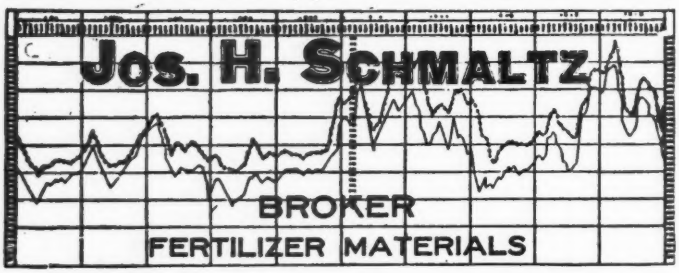

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